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Volume XVII OCTOBER 1956 Number 10

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DISEASES OF THE NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

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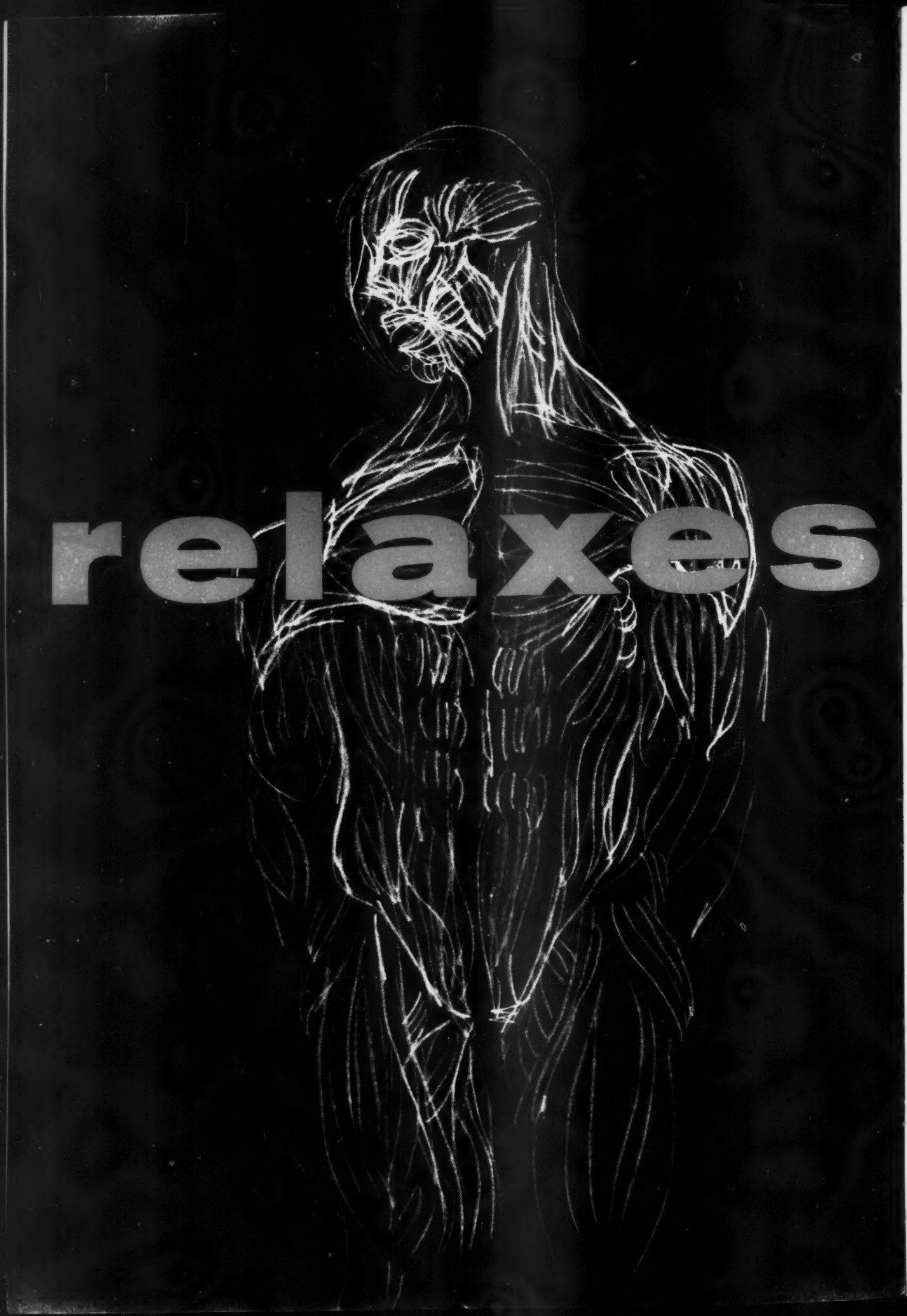
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(1) Rodriguez-Gomez, M.; Valdes-Rodriguez, A., and Drew, A. L.: J.A.M.A. 160:752 (Mar. 3) 1956.
(2) Abrahamsen, E. H., and Baird, H. W., III: J.A.M.A. 160:749 (Mar. 3) 1956.

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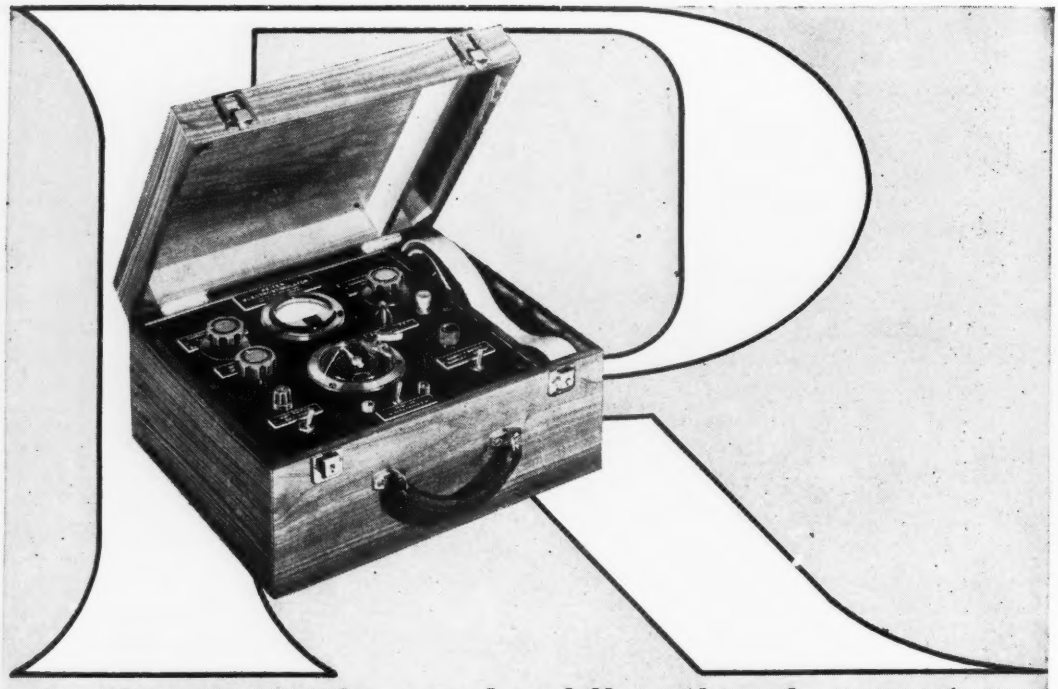

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1. Yohe, C.D.: in Chlorpromazine and Mental Health, Philadelphia, Lea & Febiger, 1955.

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DISEASES *of the* Nervous System

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

Abnormal Electroencephalographic Findings in Severe Behavior Disorders

EDWARD D. SCHWADE, M.D., and SARA G. GEIGER, M.D.
Milwaukee, Wisconsin

Impulsive behavior which becomes compulsive after an exciting factor has released the emotions has been noted over the years. This, possibly, is the behavior described legally as the irresistible impulse, an acting-out behavior which is beyond the ability of the individual to control. Behavior which appeared to be beyond the control of children, a driven type of activity, was noted among children who were brought to the Milwaukee County Guidance Clinic. The impulsivity and the lack of response to usual methods of therapy for deviant behavior suggested an organic brain condition. Preliminary to laboratory procedures were thorough histories and physical, psychologic and psychiatric studies. The first electroencephalographic studies were made in 1945 but with the establishment in 1948 of the Convulsive Disorders Clinic of the Milwaukee County Dispensary it became possible to achieve complete laboratory investigation into the behavior of children in whom organicity was suspected as a conrtibuting factor.

Of 623 studied in the past ten years, 453 showed a consistent brain wave tracing of 6 and 14 per second positive spiking and 14 or 6 per second positive spiking. The age limits among those studied ranged from eighteen months to eighteen years. The association of 6 and 14 per second positive spiking with extreme behavior disorders was recognized by the writers in 1949, and study of earlier and later electroencephalographs was made.

The Behavior and Its Background

The behavior of these children is impulsive. Pressure from an emotionally traumatized past or present sparked by some related or seemingly unrelated act or emotion, apparently release controls to such an extent that the act cannot be terminated until it is completed. Supervising adults were unable to control, appeal to or redirect the child and expressed fear of danger to self, to other children, and to the child himself. This pathological behavior, similar in all ages, is characterized by impulsivity, inability to establish controls, in some no memory or awareness of the act, varying degrees of violent action without demonstrable feeling tone, and with inability to change the direction of the act until it is completed. Some appear slightly dazed after the episode while others go on as usual. The impulsivity, the immediate lack of traceable motivation, and the lack of more than transient response to individual therapy, with simultaneous therapy of parents or a parent, removes this behavior from the field of purely psychodynamics and indicates organic pathology as contributive if not causative.

Family history included migraine, explosive temper outbursts, emotional problems of varying degrees of depth, psychoses, epilepsy, psychopathic personality, alcoholism, criminality, rejection of the child, marital problems, poor interfamily relationships and immaturities at any level of development. In the patient's home, discipline was rigid, laissez faire, neglected, or within that considered healthy. In many instances the diet was not adequate and in others it was adequate, but the child was so emotionally disturbed that the intended nutrition was not utilized. The great majority were rejected children.

In the history of the children there was in each case a background of emotionally traumatic experiences, in some known brain damage, toxic or traumatic, and in others

suspected brain damage. The emotional and organic damage for the most part seemingly came early in life. At times the history was entirely normal as far as health and accidents were concerned. In some of these, emotional problems appeared to have come on after parents, not understanding the child's driven, impulsive reactions, become worn out, over-anxious, explosive and, at times, rejecting.

History of the child from the physical standpoint included chorea, encephalitis, meningitis, head injury with or without unconsciousness, severe illness with excessively high temperatures, commonly occurring before the age of two years, and difficult birth with or without cyanosis. In some no history of pathology could be elicited.

Emotionally traumatic experiences were rejections, loss of parent or parents by divorce, inadequacy, death or illness in the family, frequent changes in schools, brutal treatment, insecure family, community, interfamilial or other relationships, inadequate emotional atmosphere during infancy, physical or mental defects, and learning disabilities. In many there were frequent changes in homes with no opportunity to establish ties with the parents or parent persons or the community.

Complaints from schools and neighborhood were similar to those from homes. At times it was necessary to exclude the child from school, providing a homebound teacher, or have him attend for a limited time, or until such time as the teacher saw that tensions were rising or increasing to the point where they could not be controlled; then the child was sent from the group to individual supervision or to his home. The cooperation of the Milwaukee Schools has been exceptional.

Studies were requested for the following reasons: uncontrollable, cruelty to children and animals with lack of feeling in regard to this, parental fear of the child and for other children, near panic reactions, destructiveness and unawareness of the act, impulsive running away from home or school, larceny, fire setting, attempted suicide, aggressive behavior without adequate motivation, sexual misbehavior, excitement rising to explosiveness or violence including murder.[6,7]

Representative Cases

T. R. Born: 4-20-51

This child was first seen at eighteen months of age for consultation because of hyperactivity, uncontrolled smearing feces over self and walls, eating feces, hitting head against wall, breaking furniture, scratching his face, the furniture, biting the bed, screaming, and he was almost impossible to handle. He has been followed for three years six months.

The father was diagnosed as schizophrenic and has had no contacts with this child. The mother never wanted the child, and he was legally removed from her at six months of age because of neglect. He was in a children's institution for one year and was placed in four foster homes. In one of these he apparently formed a relationship and the above-mentioned behavior became much less severe; he was toilet trained, and adjusted to other children. However, a death in the family terminated his placement; then he regressed rapidly to his former behavior and was no longer able to get along with anyone.

The physical examination of this child was negative. Intelligence studies could not be made at the first contact because of distractibility.

As no home could be found and the desired type of hospital care was not available, it was necessary to return this child to the children's institution where he was placed in a small group and was given supportive therapy without attempting to establish close relationships with adults or children in the beginning of his stay. Medication, Serpasil, was given. Intellectually the boy is now functioning at the dull normal level of intelligence with average potential, which he can use if calm and favorably motivated. This child is adjusting in a small group of normal children. However, the driven type of hyperactivity occurs at intervals of two to three days but is far less violent than formerly.

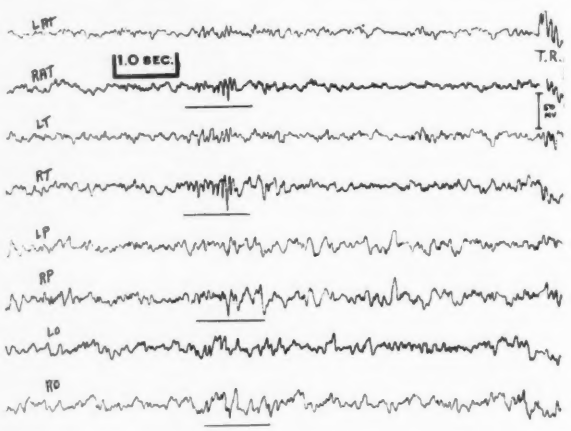

Fig. 1. T.R. Spiking deflections are positive when below the imaginary base line. Chart shows 14 per second positive spikes most in right temporal, right anterior temporal. Six per second positive spikes occur mainly in right parietal and occipital, then spreads universally. (See discussion.)

F. L. Born: 3-6-44

This nine year old boy was nervous, uncooperative, untruthful, threatened to run away, cried if scolded, was cruel to younger brother, was uncontrollable, a restless sleeper, and wet the bed. He had few friends as he always wanted his way.

The father is a nervous individual, too closely tied to his own mother. The mother is the youngest and the pet in a family of eight children. Neither parent is emotionally mature. The marital adjustment is not good. The parent-child relationships were not good, the boy being afraid of the father and seeking acceptance from the mother who was unable to give this following the birth of younger children. The patient's tie to his parents was of the hostile-dependent type.

The boy is reported as being premature and was in an incubator for four days. He was a feeding problem and had numerous contagious diseases with temperatures of 104° and 105°, he had purpura, a tonsillectomy following which transfusions were necessary. The child is subject to severe nose bleeds which are difficult to control, sleeps poorly, wanders about the house at night, is hyperactive, tense, will choke the younger siblings, and is destructive for no known purpose. There was an emergency appendectomy with the complication of a bleeding diathesis similar to hemophilia. Behavior became acute at six years of age concomitant with the birth of a younger brother and the loss of parental support, there having been no guidance in independent behavior. A tumor of the salivary gland was removed at nine years of age. Prior to examination, the parents reported possible tuberculosis and cancer. Their rejection of this child was overt.

The physical examination was reported as negative. The boy was of average intelligence.

Psychotherapy for parents and child was begun and has continued for two years after many changes of mind on the part of the parents and with attempts to direct therapy. There was much hysterical behavior on the part of the mother. Under medication, Serpasil, with psychotherapy and a change in schools, this boy improved to the extent that he was not recognized as a problem at school until a nurse, who had known him formerly, chancing to see him asked before a group of children if he was still going to the Guidance Clinic and what they were doing for his head. Following this he became defensive, the attitude of playmates changed, and behavior at school deteriorated. At this time the maternal grandmother, who had favored him, came to live in the home, was annoyed by his irritating behavior, and prayed aloud that the Lord would take him in his sleep. The boy could not have avoided hearing this. The grandmother also was not satisfied with the treatment he was getting, paid in part for an examination by a brain surgeon, including a pneumoencephalograph, all with negative findings except for a complete relapse into former behavior and an undoing of all the careful work which had gone into effecting the improved behavior. It was necessary to begin treatment again but with placement outside the home. Marked improvement is noted but is too recent to be readily evaluated. Therapy of the mother and the boy continues.

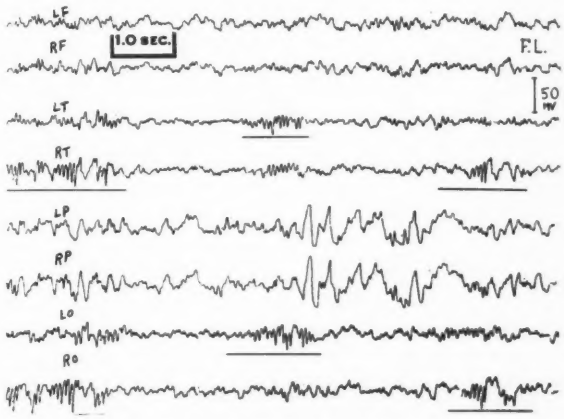

Fig. 2. F.L. Spiking deflections beneath base line are positive spikes. In this record there are positive spikes occurring 14 per second; some 6 per second positive spikes. They occur most frequently in the drowsy and sleep periods. Positive spikes of 6 and 14 are shown in both temporals, occipitals and some parietal and frontal. (See discussions.)

B. S. Born: 2-25-38

This seventeen year old youth was referred because of mood swings during which there would be violent temper outbursts. These were more frequent during the year preceding referral, and became so violent that the boy himself asked for help. His emotional reaction was of such intensity and destructiveness so violent that the mother feared him, and he feared for himself and others. He had such difficulties with his school principal that he was refused readmission to one school and evidenced the same extreme reactions to police with whom he had contacts because of violations of bicycle and driving laws.

This boy is the second of four children by the mother's first marriage to an American Indian who is described as even-tempered, phlegmatic, and ready to assist this boy whenever he can. The mother is Irish and, in common with her father, has a violent temper. Her temper becomes extremely violent and she is assaultive toward this boy with any article of furniture at hand when she is periodically alcoholic. The parents are divorced; the stepfather is weak, fearful of his wife, and leaves the home to go to his mother when his wife is intoxicated. When the boy was taken to the Detention Home for misbehavior, he preferred to remain there rather than return to his home.

The physical examination reported no abnormalities.

This youth, of at least average intelligence, recognized his problem as being beyond his control. It was sparked most violently by authoritative persons, his mother, the police, and his school principal. This youth stated that he would arrive at school feeling able to handle the day. As time went on he would develop an inner irritability, be look-

ing for slights and, by the time school was dismissed, he would be looking for a fight which he would start and usually win. He could then go home and adjust there, but realized the cause for his reaction was some inner abnormal stimulation, and not involved in his relationship with the person he fought. He could not inhibit his reaction at any point until it had passed the intense period and waned. At that time he would try to think why he did as he did and why he could not stop acting out. He was fearful of his behavior. He did well on Mesantoin, coming back to the clinic voluntarily for further medication, saying that 'it took the edge off.' Under medication he handled one of his mother's violent outbursts in a most mature manner. The home situation was at times intolerable and, learning that he could complete high school and learn a trade, he enlisted in the Armed Forces.

This youth, as nearly all of this particular syndrome, realized that his behavior was dangerous to himself and to others and wanted help. Because of the enlistment it was not possible to follow him over a period of years. However, with medication he was able to adjust in a most trying situation and he gained some insight into his total situation.

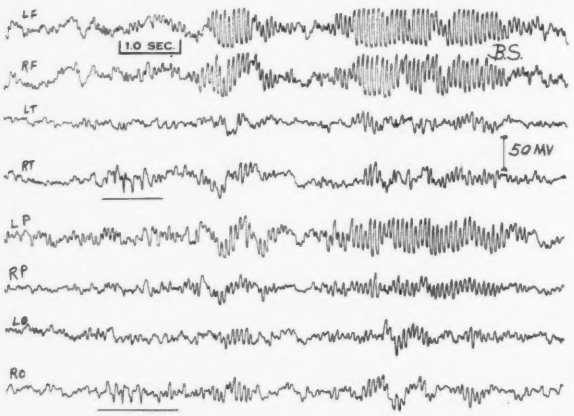

Fig. 3. B.S. Six per second positive spiking mostly confined to right temporal and right occipital areas. Note spikes have downward deflection. In all other areas there is spindling which occurs in sleep. (See discussion.)

D. R. Born: 2-16-38

Referral of this boy was made because of fire setting, daydreaming, and retreating from usual contacts. A habit of ceasing to talk and turning his head with a dazed expression in his eyes was reported. After being transferred to parochial from public school, he set fire during school time to the church in such a manner that both the school and church were in danger. Transfer back to the public school was made immediately.

The background history of both parents was negative. The mother placed this child in a nursery school from two to four years of age, and kindergarten from four to six years of age. As the oldest of five she always expected him to behave on an adult level. Neither parent was able to give much in the emotional area. From early childhood on he was destructive in his room and hostile toward his mother. He was always poor in his studies, but talented in music and played the piano exceptionally well. He was of superior intelligence but was totally unable to use this.

From the physical standpoint there were no serious illnesses or accidents.

From the psychiatric standpoint the boy was mentally ill and set the fire in response to voices. The mother was emotionally flat and unable to accept the mental illness of her son. She could not accept therapy by a family agency or through a psychiatric clinic. Stress was placed on treatment of the psychosis of the boy. With every support from the school and with psychotherapy for four years, this boy again has contact with reality, can work through his conflicts, and is adjusting in his home, school, and community.

It may be questioned that in psychosis, aggressive destructive behavior breaks through under intolerable emotional stress in those in whom there is an organic defect in the thalamus, hypothalamus, or possibly the amygdala.

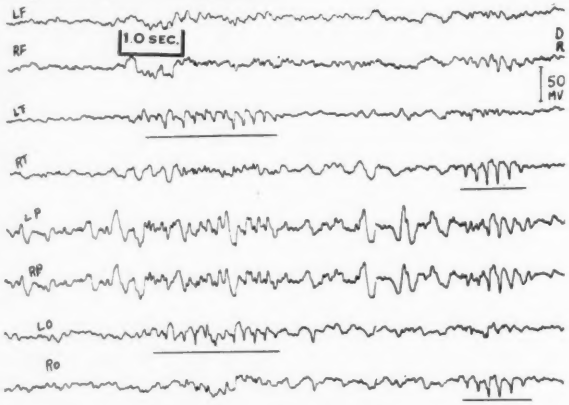

Fig. 4. D.R. Six per second spiking occurs as downward deflection of pens. These are called positive spikes because the negative phase (above the base line) is "lopped off," and the positive phase is accentuated. In this record six per second positive spikes occur in both temporals and occipitals. (See discussion.)

M. T. Born: 3-22-39

This 15½ year old boy was referred because, in company with another youth, he had committed a daylight robbery, threatening the victim with a knife. There was no known reason for this as he had a business from which he earned approximately one hundred dollars a month and had five hundred dollars in a savings account.

The paternal grandfather was alcoholic as was the father who had been examined in the Clinic because of forgery at twenty years of age. The boy identified with his father but was never close to him. The father died the day before the patient was picked up by the police and the maternal grandfather, to whom the patient was close, had died a few months earlier. The mother's background was negative. She identified the boy with his troublesome father and was very close to the daughter who was three years younger. The rivalry between the boy and the girl was intense, with the mother

supporting the girl. Temper outbursts were so sudden and violent that the mother feared the son and for the safety of herself and the daughter.

Physical studies were negative.

Intelligence tests found the boy to be functioning from the borderline to the superior level with a superior potential, being better able to handle situations which were on a strictly verbal level.

This youth was unable to form close relationships with anyone. He had been expelled from school because of extortion of money from schoolmates with threats. In the referral incident he held the knife, threatened and took the money on a busy downtown street in the early afternoon. Each incident which he described began impulsively, he could not stop; afterwards he could see no sense in his behavior and was concerned about it.

The patient was a narcissistic youth without masculine identification or guidance. Most of his behavior was denial of his own deep feelings of inadequacy, aloneness, and dependency. Before treatment was instituted, the boy ran away with a similarly disturbed girl of his age, attempted to get a marriage license, was apprehended, and returned home. Throughout there was a determined attempt on this youth's part to achieve financial independence and find a close relationship. The mother and the boy thought the temper outbursts were not so frequent or so severe when on Serpasil. Observation in the clinic indicated that tensions had decreased while under medication. However, after psychotherapy, the mother became aware of the boy's intense emotional needs and attempted to be more understanding. Three years after the initial study he has had no further difficulty. The boy understands that his emotional raections readily go beyond his control and can be a real danger to him. He has developed some insight and some inner control. Under medication the severity of the reaction was decreased except in the home where emotional pressures were strongest and most meaningful. There, when pressures were severe, the reactions broke through, though not as violently as when without medication.

In this patient's personality there was an underlayer of disorganization which was generally under control but almost constantly annoying to him. This emotional disorganization broke through into hostility directed toward the accepted sister and youths who had had a father ideal and seemingly an inner security which the patient despaired of achieving.

K. J. Born: 2-6-49

This 4½ year old boy was referred because the parents were unable to control him and feared him. He was regarded as dangerous to himself and others.

The family background of the father included alcoholism on the part of his father who deserted his children shortly after their mother's death, whom he married before her last illness. The children became public wards, one being feebleminded. The father of the patient married, divorced, and remarried. The family background of the mother showed that her parents were first cousins. She is a nervous, tense individual who prefers to work outside the home. The father is stable, despite severe emotionally traumatic experiences. In this family are five children, the first one, only, being wanted. When the oldest child was five years of age, the first of four was born with the other three arriving at about 10½ month intervals. The patient, next to the youngest, was especially unwanted and was the wrong sex.

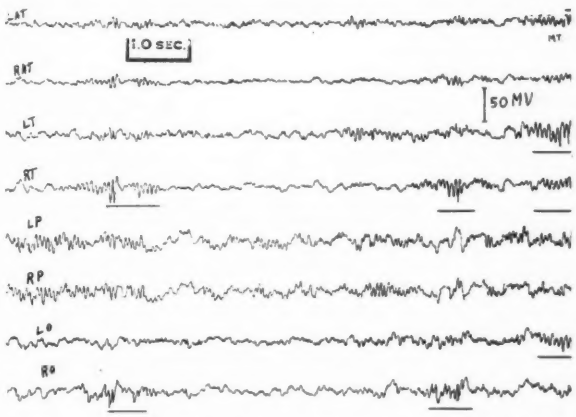

Fig. 5. M.T. Discharges of 14 per second and few 6 per second positive spikes in both temporals and occipitals. Patient is drowsy. In each case serial tracings are done at periods of one to three months. These sections photographed as above are consistent findings. (See discussion.)

Behavior was described as violent, overactive, and destructive. He jumped on the stomach of his older sister, stood at the window and, seemingly without volition, punched his fist through the glass on more than one occasion. There was extreme physical activity, short attention span, swinging and hitting with no apparent motivation, threats with butcher knives which he had secreted under his bed, wandering about the house in the night. The child had had worms and one time asked the mother if she could not do something about these worms so he would be a better boy. Hostility toward his mother was so extreme that he would stand where she could see him and wet himself to which she responded with fury, frustration, and beatings.

This boy was openly rejected by his mother and knew it. He asked the nurse visiting the home if the doctor had a little boy. The nurse replied that she did not know, and the boy said, "Maybe she would want me." The mother then stated that the doctor could have him. Such open rejection was common.

Physical examination, including pneumoencephalograph and neurologic, was negative except for dental caries.

Intellectually this boy was functioning at the high average level with much higher potentials.

Behavior did improve under medication. Thiamin hydrochloride, phenobarbital, phenobarbital and Dilantin, and Serpasil were used consecutively with no

medication for a time when change was made, along with regulation of diet. Reports from kindergarten indicated that the child was much quieter and more organized there; while at home his behavior did not improve. Behavioral response seemed greater on Serpasil.

This mother had wanted placement from the first contact with the Clinic, but only after a year of psychotherapy was she able to face her guilt reactions and able to accept placement. Placement was effected in a small institution for boys. During his early stay his behavior was impulsive, aggressive, violent, and destructive as it had been at home. It was necessary for a member of the personnel to be near him to check overactivity and aggressions. This was carried out in the same manner each time, with kindness and firmness, with attempts to get him to make an effort to attempt some control. After placement, no medication was used but psychotherapy with the child was continued, the mother having gone to work, refusing further psychotherapy.

This patient continued in therapy to have periods of tension and overactivity. On several occasions on leaving the clinic in the midst of hyperactivity, the child would stop suddenly, take a wide stance, have a momentary loss of his mask of confidence, then turn and smile weakly with a puzzled facial expression. This reaction had been noted in the children's home and coincided with the possibility of returning to his own home. Since assured that he did not need to return home, tensions have appeared rarely, and the attacks have not been noted. He is adjusting and progressing in school, and is accepted by the group, now being past seven years of age. He enters group play successfully. He expresses a desire for visits from his mother, but has not asked to return home to stay. Much hostility and a desire to have revenge against the mother is still present. In all probability this immature mother will never be able to accept this child. She will need to traumatize him to the extent that she can blame him for his behavior as long as he is dependent upon her. Therapy of the boy is continued in a structured environment. It is noteworthy that this young child was aware of and wanted to change his behavior.

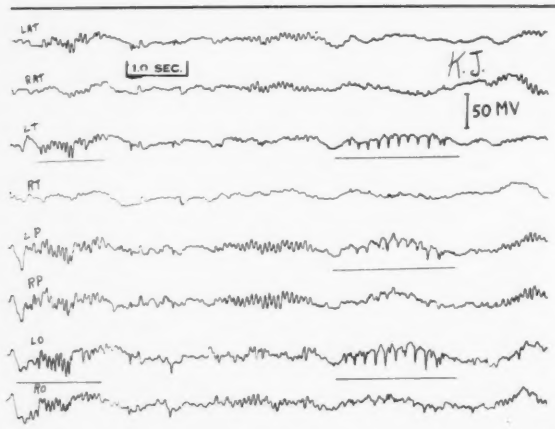

Fig. 6. K.J. Typical six per second positive spiking right temporal, parietal and occipital areas. Fourteen per second positive spikes in the same areas. Note the sharp declinations below base line. (See discussion.)

A. R. Born: 3-21-44

This ten year old boy was referred because there were times when he seemed to be out of contact with reality. Severe temper outbursts have been present from infancy. Recently during a temper outburst he threw a stone at a boy's head, could see that the boy was bleeding, yet kept on throwing stones and hitting him even when the boy was staggering. He did not seem to be able to stop throwing or to fully understand what he was doing when the foster parents took him in. Later he said that when he gets mad he wants to kill someone, other children or his foster mother. During temper outbursts there is disorganized, violent behavior. Behavior at home and at school varied. There were periods of entirely acceptable behavior alternating with periods when he was unreasoning, irresponsible, inaccessible, distrusting, hating everyone, and attacking other children without known stimuli.

Little is known of this child's parents, he having been placed in public custody at about six months of age. As far as is known, parental health was satisfactory as was heredity. He was placed in his present foster home at twenty months of age, there having been four placements previously, with little known of the emotional atmosphere in these placements.

This child was in poor condition at birth. Cyanosis was present and oxygen was necessary. During infancy he had numerous respiratory infections. He was hospitalized with a temperature of 103° at 5 years, projectile vomiting, headache, abdominal pain, and anemia. He re-entered the hospital in one month with complaints of failing vision, and blindness was feared. He was released in ten days and, in the following months, there were three incidents when the boy complained of impaired vision for periods of twenty minutes to two hours at a time. No organic eye condition was found. He later had pneumonia and later bronchitis. Physical examination was essentially negative at the time of the diagnostic study.

Psychologic study made over eleven years indicates a gradual increase in functioning intellectual capacity. He is now functioning on the average intellectual level having consistently tested as dull normal previously.

The boy had recognition of his emotional problems and wanted help. His problems were intensified by the fact that he did not form a close relationship to the foster parents. Their only child, a daughter who is five and one half years older than the patient, decided to leave home at sixteen years and enter a religious order. The effect of this on her parents was devastating. It was at this time that the boy's problems became acute and his behavior violent. He had been a problem in school from the second grade on as he was attempting

school work which was beyond his capacity. At about the time of the height of the emotional tension in the home, it was necessary for him to enter a public school for a time. There his behavior problems were so severe that he was accepted neither by teachers nor by children. Behavior was so violent and lacking in feeling that placement in a small institution was necessary. The tensions and trigger reactions responded to Tridione and phenobarbital. Adjustment with other children is now satisfactory. He has returned to his foster parents after somewhat over a year in the children's institution during which time he was and continues to be under psychotherapy and medication. Under pressure there has been defiant and annoying behavior with some destructiveness, but no personal violence. He presents the personality picture of the psychopath and the prognosis is guarded.

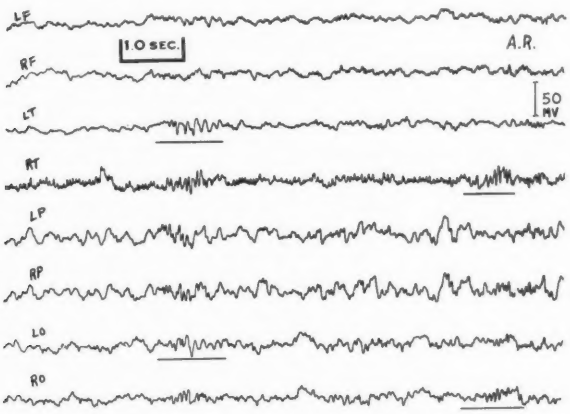

Fig. 7. A.R. Six and 14 positive spiking in both temporals and occipitals. In most serial tracings the positive spiking occurs in one temporal and its occipital area in the same hemisphere. (See discussion.)

Y. N. Born: 11-28-41

This youth of nearly fourteen years of age was referred because of damaging, destroying, and taking things without known motivation. At the time of referral he had been visiting in a small town in the northern part of the state. The day before returning home he entered a garage (owners unknown to him), put sand in the radiators of two cars, took a watch from one, broke it and threw it away, let the air out of tires, sawed off an aerial, poured oil on the hood of a car, lit a paper carton of matches under the motor, stole tools and threw them in the river, took a hack saw and sawed through the anchoring rope of a boat, permitting the boat to drift down the river. One act followed the other immediately. There was no known provocation and he was unable to explain his acts.

This boy's father hated his father who believed in physical punishment only. The first three years of his life, the patient received much attention from his father, but was pushed aside as soon as the next child arrived. The father became abrupt and punitive as his children grow older. The mother was emotionally flat and protective of this child from his father in order to avoid difficulties. No personality or physical deviations were noted in the background of either parent's family other than the rigidity of the father.

This child did not adjust well to supervision or to other children in kindergarten. In the first grade there were no known problems. However, in the second grade he began taking bicycles, fighting with other children, and wet his clothes on the way to school. He did not obey, and did not apply himself. There was a new baby in the family at this time, and the father entered the armed service. The patient was too difficult for the mother to handle and he was placed in a parochial boarding school, which he still resents. He has an extreme temper which is slow to rise. He gets along well for a time, then there is a period when he is stubborn, negative, or impulsive. He had a severe case of measles accompanied by a probable encephalitis. In 1951 he had an ear infection and broke a leg. In 1954 he broke an arm, and in 1955 a thumb. There was marked sibling rivalry, and this child's adjustment reaction was to withdraw. In the home he never showed his feelings, his relationships were poor, and he did not face reality.

The physical examination was negative.

Nine months after his diagnostic study when his therapist was absent from the Clinic for a time, he was in a series of difficulties, exposing himself, burglarizing homes, and in some smashing television sets, mirrors, and other furniture. He was always alone and could find no reason for his behavior.

This youth, functioning at the dull normal level of intelligence, has a deep-seated emotional problem centering in interfamily relationships. Neither parent is able to give much emotionally. A flat emotional reaction characterizes his narration of his acts. When frustrated in deep emotions, he becomes emotionally disorganized because he is not acceptable, and reacts in an immature emotional and destructive manner projecting his feelings, to date, to inanimate objects. The organic defect, from whatever cause, makes his behavior unpredictable

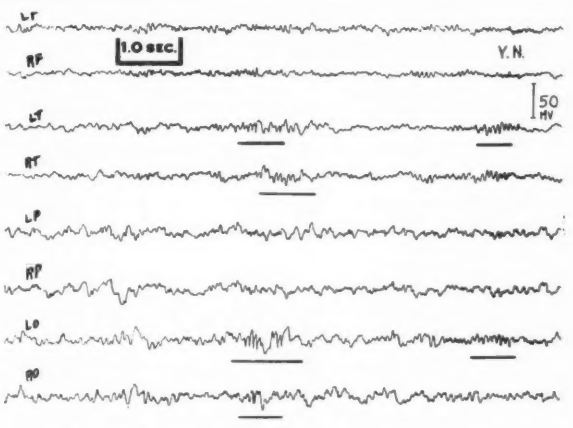

Fig. 8. Y.N. Fourteen per second positive spiking in both temporals and occipitals. Larval spikes and domes characteristic of petit mal variant not shown. (See Discussion.)

and dangerous. He is under medication receiving Tridione and phenobarbital.

This boy has been placed in a neutral environment from which his contacts with his home are continued. Psychotherapy continues with him and his mother, both of whom are slow to gain insight. The extremely rigid father is not interested in psychotherapy. The mother continues to be resistive and superficial. Impulsive behavior has not been noted in the past months, and school adjustment has improved, but this youth is considered as potentially dangerous. For a period of months, he has been considered as perfect in behavior, but he has gained no insight.

Discussion

Factors responsible for 6 or 14 per second positive spiking or 6 and 14 per second positive spiking are not definite, but may have origin in traumatic, toxic, or hereditary conditions with damage to the thalamus, hypothalamus, or possibly the amygdala, or to all areas.[1,2,3,4] It is germaine that this electroencephalographic abnormality is rarely seen beyond eighteen years of age. In this series boys outnumber girls two to one. The personality overlay may be apparently normal or pathologic, but the potential for acting-out is always there, being released by emotionally traumatic situations.

The reaction, when severe, is comparable to a grand mal epileptic seizure but is concerned only with the discharge of energy through emotional routes primarily, the motor acts being secondary to the demands of the emotions. The patient has no more control over his behavior than the epileptic individual has over grand mal seizure. This organically determined behavior occurs when there is a deep threat to the safety of the ego of the individual and to his status in his environment. Patterns of behavior are formed early, are dependent upon care in infancy, and depend on the balance between emotional and/or physical security, suppression, and expression. When there is damage in the thalamus, hypothalamus, or possibly the amygdala, emotions break through the layers of learned or hereditary resistances or controls to unleash the primitive and uncontrolled emotion.

Emotional stress before integration of the ego makes those with this pathology more vulnerable as they lack a certain hardening or strength gained through basic emotional security and guidance in emotionally threatening experiences during infancy and early childhood. In all of these cases there was disturbance in parent-child relationships, especially between the mother and the child. Usually there was a deep anxiety which acted as a protective layer and many had somatic complaints, but both merged into compulsion with total release of emotions, all levels of personality maturation being disregarded. The release of emotions is followed by relief of tensions, but there is no healthy satisfaction and interpersonal interaction continues on an unhealthy basis.

In view of the electroencephalographic changes anti-convulsive drugs were used at one time or another. Medication most commonly used consisted of Dilantin, Thorazine, Tridione, Phenurone, Mesantoin, phenobarbital alone and in combination, thiamin, and Serpasil. All were useful, but the impression was gained that the anti-convulsants were less effective and that Serpasil in small dosage gave the quickest change in reaction. This was evident in the longer attention span and less trigger-like response to emotional stimuli. Serpasil in doses of 0.25 mg. three to four times daily was given. It is sometimes necessary to increase the dose because of excessive hyperactivity. It is of interest that there is little evidence of blood pressure change and no objectionable side effects. Serpasil lessens excessive activity without irritability which frequently is seen with barbiturates. The use of the drug makes it possible to use psychotherapy, which is essential. Many patients are using Thorazine (chlorpromazine) and doing nicely, especially brain injured chlidren with 6 and 14 per second positive spiking. Sometimes a combination of Serpasil and Thorazine has been used effectively. With Serpasil many patients become tractable in school and are able to function well at home. Changes in diet and rest habits were made where needed.

In 453 of the 623 cases reported, there are distinctive electroencephalographic findings consisting of 6 and 14 per second positive spiking together, or 6 per second positive spiking alone, or 14 per second positive spiking alone. In most instances this activity is confined to one temporal and its like side in the occipital area. In some instances there

seems to be a unilateral dominance of the positive spiking and later positive spiking universally. In many instances there are also spike and dome discharges, negative spiking, and other dysrhythmias, but no clinical evidence of epilepsy.

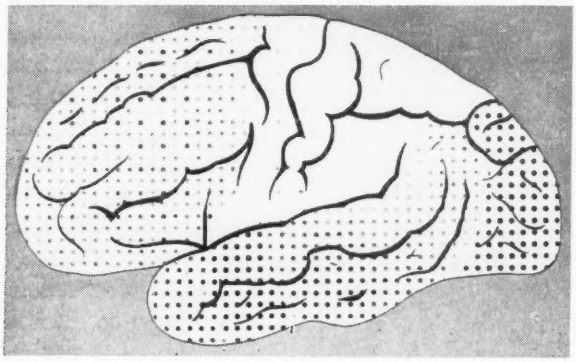

Fig. 9. BRAIN LOCATIONS. These disturbances are strongest in the temporal and occipital lobes. They appear to lesser degree in the anterior temporal lobes, less still in the frontal lobes and least in the parietal lobes.

EEG Dominance—Frequency in This Series

Dominance of 6/second positive spiking	51 cases
Dominance of 14/second positive spiking	33 cases
Both 6/second and 14/second positive spiking	336 cases

Other Abnormal EEG Findings Complicating 6 Per Second and 14 Per Second Positive Spiking

Petit Mal Varieties	18 cases
Spiking Compatible with Grand Mal	3 cases
Psychomotor Variant	10 cases
Abnormal Fast or Slow	2 cases

No Clinical Findings of Epilepsy. Some EEG Findings Suggestive of Epilepsy

Originally described by Gibbs and Gibbs,[1] the negative phase of electroencephalographic activity appears to be cut off and the positive phase is quite sharply defined. Originally it appeared that the electric disturbance was generated from the cortex, but Gibbs in 1932,[2] and Penfield, Erickson, and Tarlov, 1940,[3] Cress and Gibbs, 1948;[4] Gibbs and Gibbs in 1952[5] demonstrated that electrical phenomena could be recorded from the subcortical areas, and especially the thalamus and hypothalamus. These correlates are especially significant when the clinical symptoms are within the realm of what is described as "Thalamic fits."

Morrison and his collaborators[8] in 1942 have shown that spindle formation of 14 per second occurs in the cat which is attributable to the thalamic region. Fourteen per second spindling occurs in man in the sleeping record. Magoun and Lindsley[9] have shown that spindling of 14 per second is controlled by the thalamus and/or hypothalamus. Gibbs and his collaborators[1] feel that 6 and 14 positive spikes by virtue of the positive electric sign in all cortical areas originate subcortically. Walter and his coworkers[10] have demonstrated a case of hypothalamic tumor in which sleep was pathologic and demonstrated electroencephalographic findings of persistent spindling. Gibbs assumes that during sleep the thalamic and hypothalamic centers are normally the pacemaker of cortical activity and that disordered functioning of these deep centers appears as a distortion of normal sleep patterns, such as 6 and 14 per second positive rhythm. Grossman[11] has carried out experiments with cats which corroborate the findings of Gibbs. He has shown that spindle activity can be changed into positive bursts by superficial application of depressant drugs blocking the superficial layers of the cerebral cortex. McCulloch[12] in 1949 had shown that killing the outer layers of the cortex by thermocoagulation, the surface positive phase of the strychnine spike remains, but the surface negative phase is gone. The symptomatology of 6 and 14 per second positive spiking is not to be confused with psychomotor epilepsy. The attack in psychomotor epilepsy is autistic, confused and without coordination. The several cases of Gibbs and the authors, who committed murder show compulsive "acting out" with a considerable degree of skill and precision.

Summary

The authors found with Gibbs and Gibbs that it was exceptional to have clinical seizures with the 6 and 14 per second positive spiking. It is believed that clinically there are disorders of the brain which have a characteristic dysrhythmia which should not be classified with clinical epilepsy.

In this group of 623 patients there were five bizarre impulsive-compulsive murders. Two of these cases are reported in the literature, Schwade and Geiger,[6] Schwade and Otto.[7] It is possible that disorganized thalamic, hypothalamic, or possibly amygdalic

impulses are released by a trigger-like stimulus, and acted out without cortical restraint. Several tracings may be necessary before the wave sequence cited is found.

If serious presonality distortion is not to occur more frequently, it is essential that general practitioners and pediatricians recognize the type of behavior described as serious and in some instances dangerous. The latter potential is always there. There are not enough neurologists and psychiatrists geographically located so that they can handle these problems. The emotional problems of the parents, as well as those of the children, are equally important in treating this syndrome. Medication is helpful in certain phases of the abnormal behavior and may be required over a long period of time. An organic defect may be present, but unless sparked by deep emotional disturbances the person does not present outstanding problems or become a menace in the community. Many undetected cases undoubtedly exist where emotional development has been so normal and stresses so limited that this reaction has not been released. The pathologic behavior is usually directed externally, only rarely against self. Insight can be developed and may become protective of basic ego safety although, in defense or for revenge, the earlier types of violent reactions may break through. The most successful therapy makes the child's ego safe within his own self concept and achieves a general security in the child's world. Growth from a helpless, defenseless, chaotic nonentity to an integrated individual can be achieved.

Delinquency and criminality in children and youth occur in those who have emotional problems. Associated with these in many instances is brain pathology which laboratory experiments indicate may be located mainly in the thalamus, hypothalamus, or possibly the amygdala. The child feels different. He does not know how to deal with the inconsistencies which he finds in himself and about those undefined uncertainties from within he develops anxiety and/or defensive reactions. He has a poor body concept and lacks ego strengths, having failed to some degree in all developmental emotional levels, hence, a lack of a healthy integration of the personality is present.

When there is a threat to the weak self concept, these patients utilize defense mechanisms ranging from annoying behavior through destructiveness and violence. It was rare not to find some psychosomatic complaints, ranging from vague pains, through stomach upsets, circulatory disturbances, and severe headaches. It seems that the 6 and 14 per second positive spiking produced the most violently uncontrolled behavior, with 6 per second positive spiking somewhat less violent, and the 14 per second positive spiking—violent. Such abnormal electroencephalographic findings are present in a considerable percentage of the children usually spoken of as severely emotionally disturbed.

It is urgent that a way be found to handle this type of behavior in the community through early psychiatric and medical care or through medical care alone if psychiatric treatment is not available. This would avoid the emotionally traumatic experience of institutionalization for the child and the costly care by the state. Treatment in as nearly a normal environment (the home if feasible) as is possible is desirable. Group pressure causes the child to bring from within himself some recognition of his problem and its dynamics. Prevention of more serious behavior, rather than attempted care after pathological behavior is deeply fixed, in general, can be effected in the community.

Most interesting and challenging is the use of psychosomatic complaints and the final explosion through behavior when emotional tensions become so intense that they threaten the safety of the ego; then all controls are eliminated and only primitive behavior emerges which has no regard for anything, even the self. The child has asked for help through physical complaints, finds revenge and defense in his aggressive behavior, and feels nothing else could harm him.

Conclusion

In every child or adult who has pathology in the thalamus, hypothalamus, or possibly the amygdala, there is a potential for violently destructive behavior. This behavior occurs under extreme emotional stress when there is a serious threat to the integration of the personality. Youthful crime and murder are not so likely to be unanticipated

when the presence of 6 and 14 per second positive spiking is known. Treatment by the general practitioner and pediatrician is essential if prevention of serious behavior problems is to be a reality rather than the verbalism it is at present. The authors feel that the total reaction together with the classical electroencephalographic findings constitute a clinical entity.

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Studies of the Behavioral Effects of Ritalin

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I. SUMMARY OF PREVIOUS REPORTS

A. Pharmacological Studies in Animals.

Ritalin has been found to be a central nervous system stimulant with properties resembling those of amphetamine and caffeine. It causes "psychomotor" stimulation and hyperactivity in the form of restlessness, running, and repetitive movements such as twitching or head jerking. It does not produce as marked peripheral sympathicomimetic effects as amphetamine. The psychomotor stimulation produced by either Ritalin or caffeine is inhibited by reserpine. In monkeys, with Parkinsonian-like tremors caused by electrocoagulation of brain stem areas, it is claimed that Ritalin reduces the frequency and duration of the tremors.

B. Clinical Trials in Psychiatric Patients.

Carter[1] has given Ritalin to a group of mental defective, spastic, and epileptic patients. He reported that it was effective in relieving the sedative effects of reserpine and in decreasing lethargy and dullness from high dosage of anti-convulsant medication. As a result, there was improvement in individual behavior, sociability, and "functional I.Q." It is possible that comparable results could have been achieved with other analeptic drugs.

Ferguson[2,3,4,5] has described a series of clinical trials with Ritalin and combinations

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of Ritalin and reserpine in chronically ill psychiatric patients on the wards of the Traverse City State Hospital, Michigan. He confirmed Carter's belief that Ritalin was of value in counteracting the "depressive" (in the sense of lethargy and drowsiness) effects of reserpine. However, Ferguson also reported results which he apparently does not regard as attributable simply to Ritalin's analeptic properties. These results consist of significant improvement in behavior of a large percentage of chronically psychotic patients treated with Ritalin. He has characterized this improvement with phrases such as "mental awakening" or "awakening to reality." He observed an "increase in motor activity toward normal" and that the patients "seemed to awaken toward reality with a generalized, coordinated increase in motor activity and without evidence of aggressiveness."[2,3]

"Double-blind" methods were not routinely used in these studies, and there is the possibility that rater bias affected the observations. Furthermore, evidence as to the reliability of the raters or the methods used was not given. Although some "control" groups were studied, information is not given to justify the assumption that these patients were controls in a methodological sense. Unless a study is designed so that intervening variables have comparable effect upon both control and drug-treated groups, one cannot conclude that the drug is the critical variable responsible for the observed changes. For example, the introduction of a drug study may cause significant improvement in the therapeutic climate of a chronic ward—especially if beneficial results are anticipated. The morale, motivation, and therapeutic enthusiasm of the ward staff tend to increase. These attitudinal changes may lead to more active participation and interpersonal exchange with the patients and promote the feeling on the part of the staff that the patients have a greater potential for rehabilitation than before. Actually, such potential may have previously been present. The gains in patient behavior incident to the increased rehabilitation efforts may be misconstrued as drug effects. The longer the duration of a study the greater is the probability that intervening variables have influenced the changes observed. A general review of drug evaluation methods and possible sources of error in their use have been given in a previous article.[6]

II. PILOT STUDIES OF RITALIN ALONE AND IN COMBINATION WITH ATARACTIC DRGS

A. Methods and General Conditions.

With the exception of one case of hepatolenticular degeneration and one of manic psychosis, all cases studied were chronic, well-stabilized schizophrenics. The activity program for each case was held constant during the drug studies. No changes in ward personnel were made. The patients were not aware of the nature of the drugs they were receiving. The experimental subjects were seen frequently, most of them in daily clinical interviews, by the ward psychiatrist, who was aware of the medication schedule. Other observations were obtained from aides who were not aware of the drugs given. Formal rating scale and rigorous double-blind methods were not employed. Unless otherwise noted, the medications were given in sequence. The studies were confined to relatively short periods to reduce the probability of effects secondary to intervening variables.

B. Summary of Protocols.

Case No. 1: Male, age 33; schizophrenia, chronic, undifferentiated; stabilized in a deluded, withdrawn state. No significant therapeutic response to previous somatic therapy or treatment for several months with reserpine, Thorazine, or combinations of these drugs.

Drug trials: Ritalin 20 mg. t.i.d., reserpine 3 mg. at bedtime: 30 days.
Thorazine 100 mg. t.i.d., reserpine 2 mg. at bedtime: 30 days

Impression: The addition of Ritalin appeared to cause slight increase in the subject's overall motility. Changes in the psychotic process or appearance of more rewarding patterns of behavior were not observed.

Case No. 2: Male, age 26; schizophrenia, chronic, undifferentiated; withdrawn uncommunicative, suspicious, but passively cooperative.

Drug trials: Reserpine 1 mg. q.i.d.: 21 days.
Ritalin 10-20 mg. q.i.d., reserpine 0.5-1.0 mg. q.i.d.: 19 days.

Impression: No significant changes in mental status were observed with the addition or withdrawal of these drugs.

Case No. 3: Male, age 34; schizophrenia, chronic, undifferentiated; underactive, seclusive.

Drug trials: Reserpine 0.25 mg. t.i.d.: 31 days.
Reserpine 0.25 mg. t.i.d.; Ritalin 10-20 mg. t.i.d.: 26 days.

Impression: With the addition of Ritalin, slight increase in activity and talking was noted, but he complained of feeling more "mixed up." The psychotic process remained unchanged.

Case No. 4: Male, age 37; schizophrenia, chronic, hebephrenic; no significant improvement after years of hospitalization and repeated courses of insulin and E.C.T. Gradually became quieter, more cooperative, and showed less hebephrenic behavior during several months of combined medication with reserpine and Thorazine. Dosage of these drugs was limited by the appearance of marked lethargy.

Drug trials: Thorazine 150 mg. q.i.d.; Ritalin 10 mg. t.i.d.: 50 days.

Impression: With the addition of Ritalin the subject appeared more alert and responsive. Previous therapeutic gain from the ataractic drugs was not impaired.

Case No. 5: Male, age 29; schizophrenia, paranoid; withdrawn, underactive, suspicious, primarily mute, frequently impulsively assaultive.

Drug trials: Thorazine 100-200 mg. t.i.d.: 90 days.
Thorazine 100 mg. t.i.d.; Ritalin 20 mg. t.i.d.: 30 days.

Impression: During Thorazine treatment, the patient became more underactive and assaultive episodes were less frequent; there was no change in the basic psychotic process. With the addition of Ritalin, there was an increase in general activity but an increasing frequency of assaults. More rewarding patterns of behavior did not appear.

Case No. 6: Male, age 31; schizophrenia, paranoid type; the patient was of particular interest because of persistent, frequent auditory hallucinations; generally underactive and withdrawn.

Drug trials: Frenquel 20-80 mg. q.i.d.: 23 days.
Thorazine 100 mg. q.i.d.; Frenquel 40 mg. q.i.d.: 8 days.
Thorazine 50 mg. q.i.d.: 4 days.
Thorazine 100 mg. q.i.d.; Ritalin 20 mg. t.i.d.: 7 days.
Ritalin 10 mg. t.i.d.: 7 days.

Impression: Medication with Frenquel alone produced no observable effects upon the subject's hallucinations or general behavior. With the addition of Thorazine, he became quieter, and there was slight decrease in the frequency of hallucinations. No change in his psychotic process occurred. With the addition of Ritalin, there was an increase in frequency of hallucinations and the patient became more paranoid in attitude, accusing other patients of making him "nervous." These changes persisted when the patient was on Ritalin alone. He returned to his pre-treatment mental status within 48 hours of stopping Ritalin.

Case No. 7: Male, age 34; schizophrenia, paranoid type; underactive, withdrawn, many hypochondriacal complaints, poorly structured paranoid delusions.

Drug trials: Thorazine 100 mg. t.i.d.: 33 days.
Thorazine 100 mg. t.i.d.; Ritalin 10 mg. q.i.d.: 30 days.
Thorazine 100 mg. t.i.d.: 7 days.

Impression: Slight improvement in patient's mental state occurred on Thorazine. He became less anxious and hypochondriacal. No change in the psychotic process was noted. With the addition of Ritalin his somatic complaints returned in full force, and he described new feelings of "nervousness." He apparently felt and appeared less well than before. These untoward changs subsided promptly with omission of Ritalin.

Case No. 8: Male, age 56; manic psychosis; typical manic episodes which have recurred six times at 4-year intervals and lasted previously as long as 6 months. Good adjustment during the interims.

Drug trials: Thorazine 100 mg. t.i.d.: 14 days.
All drugs omitted for 14 days.
Ritalin 10 mg. t.i.d.: 7 days.
Thorazine 75 mg. q.i.d.: 3 days.
Thorazine 75 mg. q.i.d.; reserpine 0.25 mg. q.i.d.: 21 days.

Impression: Prompt and extensive improvement in his manic behavior occurred on initial therapy with Thorazine. With the omission of Thorazine, he relapsed within one week and remained stabilized at his admission level for the second week. During Ritalin therapy, he became progressively more excited, inappropriate and disorganized; hallucinations appeared for the first time. On Thorazine and reserpine, he returned to a normal mental status within 24 days.

Case No. 9: Male, age 47; schizophrenia, undifferentiated; auditory hallucinations, negativistic, withdrawn, incoherent, passively cooperative.

Drug trials: Ritalin 10-30 mg. t.i.d.: 21 days.
Ritalin placebo t.i.d.: 40 days.

Impression: No changes in mental status or behavior were observed.

Case No. 10: Male, age 44; schizophrenia, hebephrenic; seclusive, negativistic, surly, uncooperative, underactive.

Drug trials: Ritalin 10-30 t.i.d.: 52 days.
Ritalin placebo t.i.d.: 40 days.

Impression: No significant changes in behavior ascribable to Ritalin were observed.

Case No. 11: Male, age 39; schizophrenia, undifferentiated; seclusive, mute, untidy, auditory hallucinations, underactive.

Drug trials: Ritalin 10-20 mg. t.i.d.; reserpine 5 mg. at bedtime: 15 days.
Ritalin placebo 10 mg. t.i.d.; reserpine 5 mg. at bedtime: 37 days.
Reserpine 5 mg. at bedtime: 40 days.

Impression: No significant changes in behavior or mental status were observed. There was no difference between Ritalin and Ritalin placebo on subject's activity or level of awareness.

Case No. 12: Male, age 39; schizophrenia, hebephrenic; hyperactive, delusional, incoherent speech, grimacing and silly behavior.

Drug trials: reserpine 3 mg. at bedtime: 36 days.
Thorazine 100 mg. q.i.d.: 24 days.
Thorazine 100 mg. q.i.d.; Ritalin 10 mg. q.i.d.: 28 days.
Ritalin 10 mg. q.i.d.: 14 days.

Impression: Reserpine and Thorazine quieted the patient without significant effect upon the psychotic process. The lethargy and drowsiness caused by the Thorazine dosage were not alleviated by Ritalin. When on Ritalin alone, he gradually returned to his usual hebephrenic mental state.

Case No. 13: Male, age 36; pseudosclerosis of Westphal - Strümpell (hepatolenticular degeneration); extensive neurological deficit manifested by gross tremor and poor coordination, subject to frequent outbursts of assaultiveness, vulgarity, and frenzied screaming.

Drug trials: This patient was treated for many months with Thorazine and reserpine alone and in various combinations. Tolerance for reserpine was limited by excessive salivation. Thorazine in amounts adequate to produce significant improvement in emotional control caused such aggravation of his tremor and incoordination that he lost the minimal capacity for self-care that he possessed. After repeated trials, it was found that Thorazine 25 mg. b.i.d., reserpine 0.25 mg. b.i.d., and Ritalin 10 mg. b.i.d. was an optimum combination in terms of his mental status and neurological disability.

Impression: By stopping and starting Ritalin, it was demonstrated that this was the critical feature in decreasing the aggravation of his tremor produced by the other drugs.

III. STUDIES ON RITALIN BY BEHAVIORAL RATING SCALE METHODS

A. Study No. 1

1. Method: Five regressed, withdrawn, underactive patients were rated on a sixteen item behavioral rating scale over a six-week period during which they received Ritalin, in doses of 10-30 mg. t.i.d., and during a subsequent seven weeks during which they received Ritalin placebos. Three ratings during the drug and two ratings during the placebo period were made by a trained aide rater, who had demonstrated reliability in previous drug studies. The rater was aware that the subjects were receiving Ritalin but was not aware of the substitution of a placebo period. No information was given as to anticipated effects of Ritalin. By cluster analysis, this scale, well standardized from previous studies, samples behavioral areas which have been labeled as communication, affect, accessibility, and motility. Significant changes in all these areas have been demonstrated with this scale in previous studies of reserpine and Thorazine treatment of schizophrenic patients.

2. Results: Consistent, small increases in motility were noted in three of five patients during the drug period. No significant changes occurred in the other areas. After 7 weeks of placebo the movement scores of these three patients showed essentially the same small increase.

3. Comments: The possibility of rater bias was not excluded in this study. The persistence of the motility gains during the placebo period could represent the rater's bias in continuing to look for increased movement, or the patients may actually have remained more active. The second hypothesis is supported by ward personnel who felt that the increase in movement was a real change. The possibility that these changes were spontaneous cannot be excluded. The persistent increase in movement, if real, could represent the adoption by the patients of a behavior pattern with more activity, initiated by Ritalin and sustained by other factors. From other experience with Ritalin, it is doubted that this phenomenon is a persistent drug effect as Ferguson has suggested.[3]

B. Study No. 2

1. Method and General Conditions: This study was carried out on an NP-TB ward. The patients were chronic schizophrenics. Most of them were withdrawn, regressed, and underactive. They were being treated for pulmonary tuberculosis on an ambulatory basis. They were accustomed to considerable attention in the form of examinations and various medications. Ward nurses and aides and the activity program were held constant during the study.

Twenty patients were randomly divided into ten drug subjects and ten controls. The drug subjects were treated with Ritalin 20 mg. t.i.d. for 13 days, 30 mg. t.i.d. for 7 days, and 40 mg t.i.d. for the remaining 60 days of the study. The control group received an

equal number of Ritalin placebos. The raters were systematically trained and their reliability established.

The behavioral rating scale, discussed in Study No. 1, was completed weekly during the study by four independent raters, three aides and one nurse. The Hospital Adjustment Scale (Ferguson) was used independently by one nurse and one aide at the beginning and end of the study. The study was of double-blind type.

One control subject, a paranoid schizophrenic, became increasingly overactive and assaultive, and to avoid transferring him to another ward, he was shifted from placebo to reserpine 1 mg. t.i.d. on the 40th day of the project. He showed less disturbed behavior during the remainder of the study. This was reflected in a significant increase in the "cooperation' 'area score of the behavioral rating scale. One drug subject was withdrawn in the third week to undergo surgical treatment for his tuberculosis. With these exceptions, the experimental design was carried out as planned.

2. Results: With the exception noted above, no consistent or significant change was noted in the behavioral rating scores of the drug or control group. No significant improvement in hospital adjustment was noted on the Hospital Adjustment Scale. Clinical observations by the staff psychiatrist controlling medication and review of daily nursing notes failed to reveal significant changes attributable to Ritalin.

3. Comments: In the population studied, no significant behavioral differences between drug and control groups were demonstrated.

IV. SUMMARY

The series of pilot studies suggest that Ritalin does produce observable analeptic effects in some patients. However, these effects on movement and psychomotor activity are not necessarily of therapeutic value as suggested by cases in which apparent aggravation of hallucinations, assaultiveness, anxiety, somatic complaints, or manic behavior was observed. Ritalin in some instances seemed to counteract the lethargy and drowsiness produced by Thorazine but these effects were inconstant. In one patient with hepatolenticular degeneration, Ritalin appeared to counteract the aggravation of his tremor caused by Thorazine and reserpine.

Three of five regressed, underactive schizophrenic patients studied by rating scale methods showed slight increases in the area of movement. However, because of defects in the experimental design, even these changes cannot be conclusively attributed to Ritalin. No other consistent changes in the behavioral areas sampled by this scale were observed.

In a well-controlled, double-blind study of twenty schizophrenic patients, a behavioral rating scale and the Hospital Adjustment Scale used by a group of raters failed to demonstrate behavioral changes attributable to Ritalin.

It appears that Ritalin has modest but inconsistent analeptic properties and may reduce tremors caused by Thorazine and reserpine. However, there was no evidence from these studies that it has special usefulness in the treatment of chronic schizophrenic patients.

Authors' Note: Ritalin is the trade name for methyl-phenidylacetate. The Ritalin used in these investigations was supplied by Ciba Pharmaceutical Products, Inc. Frenquel (azocyclonal) was supplied by the Wm. S. Menell Co.; Thorazine (chlorpromazine) was obtained from Smith, Kline and French Laboratories.

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Physiological Studies After Continuous Serpasil Therapy Over 18 Months

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In May 1954, shortly after the announcement of the clinical use of Serpasil in psychotics, this drug was used on a large scale for the treatment of chronic psychotic cases in this 1000 bed NP Hospital. This V.A. facility was quite recently activated and with a sudden influx of transferred psychotic cases, there was a natural lag in the training of personnel which accentuated the problem of dealing with adverse psychotic behavior. One hundred chronic cases of schizophrenics showing the most stereotyped and maladaptive behavior problems were selected for this new chemotherapy and the drug was very dramatically effective in control of behavior. Physical examinations, electrocardiograms and routine admission laboratory studies revealed no gross abnormalities other than the fact that approximately six were considered hypertensive with blood pressure exceeding 150/90 and ten showed hypotensive pressure, less than 90/60. One case showed persistent bradycardia of 40 with no other ECG abnormality. All patients had been continuously hospitalized for approximately five years and their general state of nutrition was considered good. During the first six months of Serpasil therapy, the standard dose in all patients averaged 4 mgm. orally per day. A small number of more uncooperative patients received parenteral Serpasil 5 to 15 mgm. along with oral medication during the first few weeks of treatment. After a six month period all cases were re-evaluated and most of the patients were put on a maintenance dose of Serpasil averaging two mgm. daily. This maintenance dose, with only a few exceptions, has been continued until the present time. During this entire period of continued medication, no serious side-reactions were encountered. The side-reactions frequently seen with high dosage (excessive salivation and lacrimation, along with occasional cases of rigidity with tremor) were encountered. In all instances these more objective signs were controlled by diminishing the dosage and titrating the dose carefully according to further clinical developments. We were impressed with the low over-all incidence of side-reactions with Serpasil and concluded that this drug could probably be used with a reasonable degree of safety among the chronic continued cases. In our continued observation of this group we were quite certain that the blood pressure drop, particularly in the normotensive individuals, was not of clinical significance.

We were more concerned about the occurrence of several attacks of syncope occurring without evidence of other signs of physiological shock. These were described on a few occasions as of a convulsive type. However, follow up EEG's could reveal no evidence of continuing cerebral dysrhythmia. We were properly cognizant of the fact that most of these patients had had considerable previous electroconvulsive therapy and other shock therapies, during a long period of observation, and felt that this phenomenon was a matter of natural occurrence that might possibly be found in control groups of clinically comparable chronic patients not treated with reserpine. Another complication that might also be considered as a matter of similar occurrence among chronic patients, was suffocation from aspirated food in two cases.

With such considerations in mind, it was determined that a careful physiological evaluation of a fairly large group of patients should be done after eighteen months of treatment. It was concluded by the Staff that such a study should be done only on those patients who had received Serpasil in these fairly large doses for a period of more than one year, and in those who had received no other physiological or chemotherapy during the same period of time. Twenty cases within the age range of 35 to 54 were selected on this basis. They were first given a repeat ECG and while in a reclining position, the sensitivity of the carotid sinus to compression was also recorded. Following the

ECG, blood pressure after three minutes in the standing position was registered by the same examiner.

The second phase of study was conducted by the Radiology Department: scout films were taken of the abdomen for radiographic evidence of enlargement of the liver or spleen. Following this the vallecular sign[1] was determined after the swallowing of 1½ oz. of thick barium.

The third phase of study consisted of two parts: biochemical and hematological determinations. For the sake of brevity, tables below show specific findings on only ten cases, while results of studies will be expressed on the whole group of twenty cases, since none showed significant abnormalities.

BIOCHEMICAL DATA

Mg % Blood Glucose	Mg % Blood NPN	Meq. Plasma CO-2	Meq. Plasma Chloride	Meq. Serum Na.	Meq. Serum K	Mg % Serum Cholesterol	Ceph. Floce. 48 hrs.	Thymol* Turbidity
90	38.0	25.83	103.8	148.03	4.5	175	Neg.	0.63
103	32.1	24.93	100.2	138.06	4.6	240	Neg.	0.91
100	30.7	24.48	107.7	142.01	5.1	213	Neg.	0.58
100	32.1	26.73	105.0	142.01	4.6	200	Neg.	1.35
107	27.3	24.26	98.9	140.03	4.8	248	Neg.	0.48
103	32.1	22.69	88.9	134.17	5.0	187	Neg.	1.11
100	31.3	23.58	107.7	138.06	4.8	257	Neg.	1.20
94	28.0	21.34	108.2	150.06	4.6	257	+1	0.91
100	36.1	28.98	107.7	140.03	5.1	233	Neg.	0.67
100	34.1	25.16	111.8	146.18	5.6**	205	Neg.	1.51

*Shenk-Hoagland Units. **Hemolyzed Serum.

HEMATOLOGIC DATA

WBC	Stabs	Neutro.	Lymph.	Mono.	Eosino.	Baso.	Hb.	Plate.	Hmt.
7,500	3	42	45	2	8	0	15 g%	200,000	44%
8,550	3	51	40	2	2	2	15 g%	160,000	45%
8,100	2	54	37	4	2	1	14 g%	180,000	42%
10,200	3	61	31	2	2	2	15.5 g%	210,000	46%
8,300	2	67	30	1	0	0	14 g%	190,000	42%
13,550	6	76	15	2	0	1	14.5 g%	260,000	44%
7,550	2	55	40	2	1	0	14.5 g%	190,000	41%
12,800	1	73	25	1	0	0	16 g%	140,000	51%
6,400	2	74	22	2	0	0	14 g%	280,000	42%
6,550	2	49	43	4	1	1	14 g%	200,000	42%

Results

1. The electrocardiographic study showed no changes of clinical significance; compression of the carotid sinus produced no abnormal responses. Blood pressure taken after three minutes standing erect showed the usual slight drop, within the range of 10 mm. of systolic in all instances.

2. Radiographic studies of the abdomen showed no evidence of enlargement of the liver or spleen. There was no evidence of retention of barium in the valleculae during swallowing. We could deduce no alteration of the normal swallowing reflex.

3. As described above there were no significant changes in blood chemistry, including electrolytic balance. Likewise, hematologic study showed no evidence of abnormalities of hemoglobin, red cell, white cell, differential or platelet counts.

Conclusions

1. Twenty cases of chronic psychotic schizophrenics are reported who have taken comparatively large doses of Serpasil over a continuous period of approximately eighteen months. A battery of physiologic studies reveal normal findings within this group.

2. In our experience Serpasil has proved to be a relatively safe drug for prolonged administration among the more chronic continued psychotic patients.

3. We have found no evidence of change in electrolyte balance or metabolism in this study of twenty cases such as reported by other authors[2,3] in the treatment of non-psychotic patients with its related group drug, Rauwolfia Serpentina.

4. Although a centrally acting drug such as Serpasil used over an extensive period of time may be suspected of effecting autonomic reflexes, we have found no evidence of change in carotid sinus reflex, or autonomic control of heart or deglutition reflexes.

Author's Note: The foregoing report was reviewed in the Veterans Administration under current procedure. The statements and conclusions published by the author are the result of his own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

This extensive study was the result of cooperative effort of the entire Medical Staff of the Veterans Administration Hospital, Leech Farm Road, Pittsburgh, Pa., and the excellent help of their assisting technicians.

(Serpasil used in this study is manufactured by Ciba Pharmaceutical Products, Inc.)

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Incontinence in Hospitalized Psychiatric Patients

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I. Definition

The purpose of this study is to present a preliminary survey of the various causes of incontinence in hospitalized psychiatric patients. Because the interest was on the psychosomatic aspects of this symptom, incontinence was defined here as "the unconventional elimination of feces or urine." This definition, substantially the same as that suggested by Stanton and Schwartz in 1950,[1] was adopted in preference to the usual one of "the involuntary loss of urine and feces." The cases in which a localized pathology of the genito-urinary system, gastrointestinal system, or of the related spinal centers was demonstrable as the cause of incontinence were eliminated. Included were cases in which an acute or chronic brain syndrome, with or without neurological deficit and definite electroencephalographic abnormality, had been diagnosed.

II. The Method

The entire population of 912 patients treated in a private mental hospital was studied over the period from June 1, 1954, to June 1, 1955, to determine the frequency of occurrences of incontinence as well as the related circumstances. The patients ranged in age from 14 to 92 years, and in diagnosis ranged through most of the usual categories. Treatment of these patients included psychotherapy, individual and group, electroshock and electrostimulation, insulin subcoma and coma, psychosurgery and chemotherapy, including the use of the new tranquilizing drugs, reserpine and chlorpromazine. In conjunction with the above treatments, all patients took part in an active rehabilitation program which stressed vocational and avocational training, recreational activities, and socialization. Some of the cases of incontinence were studied directly by the authors; others, a majority, were reported to the authors by the members of the medical staff who had directly treated them. The nursing notes were extensively reviewed. In consultation with one of the authors, the therapist of each patient involved completed a questionnaire covering the following categories: type of incontinence (feces or urine or both; occurrence of smearing); the circumstances under which incontinence occurred and the type of treatment.

III. The Findings

Fifty-four cases of incontinence occurred in the 912 patients. As shown in Table I 23 cases occurred among the 130 patients in the organic brain syndrome group, 20 in the schizophrenic group of 374 patients, five in 61 manic depressives, three in 40 involutional patients, and two in a group of 40 diagnosed as psychotic depressive reaction. In a group of 28 patients grouped under personality pattern disturbance, one was incontinent. The symptom was not demonstrated as occurring in the remaining patients, including 155 psychoneurotics, 50 personality trait disturbances and 21 drug addicts.

TABLE I

Incidence of Incontinence Among 912 Hospitalized Psychiatric Patients

Diagnostic Groups	Number of Patients	Cases of Incontinence	Percentage of Incidence Within the Groups
Organic brain syndrome	130	23	17.7 %
Schizophrenic reaction	374	20	5.3 %
Manic depressive reaction	61	5	8.2%
Involutional psychotic reaction	40	3	7.5 %
Psychotic depressive reaction	40	2	5.0 %
Psychoneurotic reaction	155	0	—
Personality pattern disturbance	28	1	3.6 %
Personality trait disturbance	50	0	—
Sociopathic personality disturbance	13	0	—
Drug addiction	21	0	—
TOTALS	912	54	5.92%

The significant factors leading to incontinence were as follows:

(1) *Organic Brain Syndrome*—Of the 23 incontinent patients in this group, 14 were incontinent of urine and feces, eight of urine, and one of feces alone. Although in most of these cases, no factor of psychodynamic relevance was discovered, in a few cases the

operation of a regressive psychological mechanism for the expression of hostility, or an attention seeking device could not be ruled out.

This difficulty occurred, for example, in the case of a 54 year-old woman with the diagnosis of brain syndrome associated with drug intoxication, secondary Cushing's syndrome, possible c.n.s. lupus erythematosis, and long-standing schizoid personality. The patient displayed a hostile attitude toward the therapist and the personnel throughout her hospitalization and often became incontinent of feces and urine following her outbursts of anger. Incontinence here could be interpreted as an expression of aggression, yet the obvious organic factors could also be implicated. Incidentally, in this case the incontinence was not increased or diminished by a prefrontal lobotomy, performed after the onset of the incontinence, for the control of intractable pain.

The psychological components were evident in two elderly, confused, disoriented, and deluded patients who persistently voided in wastepaper baskets or paper cups. In one case, a superimposed physical illness caused exacerbation of the incontinence.

Two of the patients in this group were given electro-convulsive treatments for concomitant affective features. For a time following therapy they showed increased incontinence as a result of the organic confusional state superimposed by electroshock. A 73 year-old patient diagnosed as a chronic brain syndrome associated with senile brain disease responded favorably to chlorpromazine; incontinence of urine and overt symptomatology both receded.

Electroencephalograms were recorded on 13 of these patients with organic brain syndrome. There were 11 abnormal or deviant tracings, and two normal records.

(2) *Schizophrenic Group*—Twenty patients were incontinent, including eight who had had a pre-frontal lobotomy, some as long as eight years before this study was undertaken. In four of the lobotomy cases, grand mal seizures with incontinence had developed after the operation. The other four patients had developed incontinence in the absence of grand mal seizures. Although the pattern of their incontinence was similar to that in the organic brain syndrome group, they did not show, in tests of comprehension, calculation, knowledge and learning, any evidence of impairment of orientation, memory and intellectual functioning which would have justified a diagnosis of brain syndrome. A psychological determinant of the incontinence was apparent in only one of these four cases: a 34-year-old paranoid schizophrenic who developed temporary incontinence and coprolognia following an unwanted visit from his mother.

Of the remaining 12 of this schizophrenic group, seven catatonics were transiently incontinent of urine during a disturbed phase of their illness. The administration of electro-convulsive therapy and/or chlorpromazine promptly terminated the incontinence. A 33 year-old female patient, a paranoid schizophrenic, experienced enuresis on four different occasions. It was the impression of the patient's therapist that the incontinence was related to dreams of a homosexual nature. A 43 year-old hebephrenic schizophrenic, who had undergone intensive analytic therapy for five years and during this period was incontinent of both urine and feces, responded promptly to a course of electro-convulsive therapy which interrupted the pattern of the incontinence. In the last three patients of the schizophrenic group, incontinence occurred as a hostile manifestation in the transference relationship.

(3) *Manic-Depressive Group*—Five cases of incontinence were detected in this group. One patient was incontinent of urine during the depressed state. In this case, electro-convulsive therapy removed the incontinence. In two other patients incontinence occurred during the manic phases. Of these, one responded well to chlorpromazine, and the other was resistant to both electro-convulsive and chemotherapy. The fourth patient, a 74 year-old woman with recurrent mood swings, became incontinent of urine shortly after beginning treatment with reserpine. Her incontinence disappeared even though reserpine was continued. The fifth patient of this series with a questionable diagnosis of manic depressive reaction was incontinent of feces during the calm period between manic attacks. In this case, also, the

therapist interpreted the incontinence as a regressive hostile act.

(4) *Involutional Group*—Three patients developed transient urinary incontinence during periods of deep depression. Electroconvulsive treatment caused remission of both the incontinence and the depression.

(5) *Psychotic Depressive Reaction*—Two patients in this group were incontinent of urine and feces following electro-convulsive therapy. The phenomenon was felt to be related to a transient organic brain syndrome due to treatment. The incontinence in both cases disappeared spontaneously after a period of two weeks.

(6) *Personality Pattern Disturbance*—In this group, only one case of incontinence appeared. A 20 year-old patient, with a diagnosis of inadequate personality, became incontinent of urine for the first time when his therapist left for a brief vacation. After his therapist's return, urinary incontinence occurred again during a therapeutic session when he was discussing his relationship to his father. The incontinence during therapy was interpreted to him as an expression of transferred hostility, and the symptoms disappeared.

IV. Comments

Analysis of the data shows that incontinence follows two patterns: 1. The phenomenon occurs periodically and without a demonstrable relationship to any environmental factor. 2. The phenomenon occurs with a clear-cut time relationship to a demonstrable environmental factor.

TABLE II

Patterns of Incontinence

Diagnostic Groups	Cases of Incontinence **Not** Related to Environmental Factors	Cases of Incontinence **Related** to Environmental Factors	Total
Organic brain syndrome	20	3	23
Psychotic depressive reaction (Post-shock confusional state)	2	0	2
Schizophrenic reaction (Post Lobotomy)	7	0	7
Schizophrenic reaction	0	13	13
Manic depressive reaction	0	5	5
Involutional psychotic reaction	0	3	3
Personality pattern disturbance	0	1	1
TOTALS	29	25	54

The first pattern was evident, as shown in table 2, when the symptom occurred in all but three of the patients diagnosed as organic brain syndrome. These showed along with the organic mental symptoms either a neurological deficit or an electroencephalographic abnormality, or both. The incontinence which occurred in seven lobotomized schizophrenics who did not show organic mental symptoms, and in two patients who experienced the symptom during a confusional state following electroshock therapy, also followed this pattern. The phenomenon as it occurred in this first instance was suggestive of impaired function due to injury to the regulatory control centers or to the correlation pathways related to the physiology of continence, as the bladder and the rectum evacuated reflexly.

The second pattern occurred in all the patients of the "psychogenic" group and three patients of the "organic" group. In these cases the incontinence developed in connection with anxiety-provoking factors stemming from the patient-doctor relationship, the ward environment, or the patient's fantasy life. In one case the symptom was interpreted as a regressive sexual equivalent related to the homosexual fantasies. In the remainder of the cases the incontinence was interpreted as a regressive hostile act.

Incontinence was not found in the group of 155 psychoneurotics. To be sure, with the method of investigation it would be difficult to detect the phenomenon in patients with an integrated ego structure who could easily hide their incontinence from others.

Electroshock therapy controlled the incontinence, as indeed the other symptomatology, in the cases of catatonic and manic depressive patients, although excessive shock therapy produced incontinence in other patients. This latter aspect was apparently true in patients of a later age group who were treated for affective features. Chemotherapy and psychotherapy were effective also. Rapid control of incontinence by therapies which readily produced improvement of the clinical symptomatology, such as shock therapy, would seem advisable in most of the psychogenic cases in order to spare the patient the shame of memories associated with profound regression. An adequate method

for the control of incontinence as it occurs in the organic patient was not found.

V. Summary

A study of incontinence as "unconventional elimination of urine and feces" was made in a neuropsychiatric hospital population of 912 patients of representative age groups and diagnostic categories; 54 patients were found to be incontinent. This phenomenon was studied in relationship to causes, behavior and therapy, and the findings were reported and analyzed. It was concluded that incontinence followed two patterns: 1. Where there was no demonstrable relationship to an environmental factor, which occurred in most of the organic patients. 2. Where this relationship could be demonstrated, as in the psychogenic cases. The therapeutic methods which produced improvement of the various symptoms also caused remission of incontinence.

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Schizophrenia and the Siamese Fighting Fish

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A rather dramatic response of the Siamese fighting fish to very small amounts of the hallucinogen, lysergic acid diethylamide (LSD-25), was reported by Abramson and Evans,[1] who suggested the possibility of detecting an abnormal metabolite in schizophrenic urine by this means. Since Frenquel, a new tranquilizing drug, is said to block both schizophrenic hallucinations and those induced by LSD-25,[2,3] it was of interest to see if this strange behavior in this fish could also be blocked.

A technique comparable to that of Abramson and Evans was employed. Each Betta splendens juvenile of about one inch in length was allowed to swim in a 200 milliliter beaker, which was half-filled with urine (or of drug) diluted to the desired concentration with seasoned aquarium water at room temperature (24° C.). Familiarity with the LSD-25 response was obtained with 20 fish. In brief, the abnormal behavior consisted of backward movements, vertical suspension of the body, "Cartesian diver" effect, a "barrel roll," a motionless "trance-like" state, marked slowing of movement, kinking of the body into an "S-shape," lateral display, and increased pigmentation. During the "trance," fish could be aroused by gentle stimulation. None of the fish died from contact with LSD-25. There were no exceptions to these effects, which occurred within minutes and did not wear off for several hours.[1]

Urine was collected from 44 chronic schizophrenics and from 50 healthy controls, with approximately equal numbers of males and females in each group. All the chronic schizophrenics had been hospitalized continuously for 12 to 48 years. A smaller number of acute schizophrenics was available: three males and two females each with a first attack and a duration of illness of one week to 3½ months. The first morning urine specimen was collected, since it was likely to be concentrated. It was hoped that a larger amount of the abnormal metabolite might be present, thereby increasing the probability of getting an effect on the fish. Urine concentrations of 25%, 50% and 100% were made immediately without storage or refrigeration in order to minimize breakdown of any excreted substances. Fish were placed in the solution and observed for 6 hours.

In both schizophrenic and control urines at 25% concentration, no abnormal response occurred. Abramson also found no change

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in normal urine at this concentration.[1] At 50% concentration some of the fish became inactive, and a few died in both schizophrenic and control groups. At 100% concentration approximately half (53%) of the fish died in the chronic schizophrenic group, and over two-thirds (68%) died in the control group. This was quite unexpected, since several other studies using paramecia,[4] tadpoles,[5] and yeast cells[6] reported more deaths with schizophrenic urine compared with control urines. As a result a "toxic factor" in schizophrenic urine was postulated. With further investigation specific gravity determinations showed that all fish deaths occurred above 1.015. When the 50% concentration of the same sample fell below 1.015, the fish survived. In those few cases where it remained above 1.015 after 50% dilution, the fish died. None of the 25% urine concentrations were above 1.015 and none of these fish died. In a series of aquarium sea salt solutions the fish died in the concentrations greater than 1.015. Therefore, the "toxicity" was not related to a specific substance, but to an inability of the fish to withstand certain concentrations. This was also noted in the acute schizophrenic specimens, all of which killed the fish at 100% concentration, having specific gravity above 1.020.

Attempts to block the LSD-25 reaction in the fish were made with those tranquilizers which are said to be helpful in schizophrenia. Frenquel (400 micrograms per milliliter), chlorpromazine (4 micrograms per milliliter), and reserpine (100 micrograms per milliliter), were given prior to, simultaneously with, and following LSD-25 (4 micrograms per milliliter). At the same time controls were run of each drug alone, LSD-25 alone, and aquarium water. Ten fish were used in each group. All the fish exposed to LSD-25, irrespective of the drug given, and whether given before, during, or after LSD-25, developed the complete LSD-25 reaction within 5 minutes and retained it for several hours after removal to aquarium water. The failure of reserpine to block LSD-25 has been noted previously by Turner and Carl.[7]

If an abnormal metabolite is excreted in the urine by schizophrenics, this method fails to demonstrate its existence and suggests that it is not related to LSD-25.

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Eastern Psychiatric Research Association Proceedings

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Psychosurgery in State Hospitals

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The term psychosurgery will be used in such a broad sense that perhaps the subject would be best described as "Neurosurgery in State Hospitals." We want to emphasize that psychosurgery, usually understood to mean operations upon the brain hemispheres for the treatment of mental disorders of so-called functional origin, should really be just a part of neurosurgery in the state hospitals. Rather than go into cumbersome statistics and explanations, some of our experiences will be singled out, with pertinent comments which may clarify our views on the subject. Most of the work referred to was done during the last few months.

Case 1. J.J.R. A 55 year old male with dementia praecox (hebephrenic) was operated upon for a right trigemenial neuralgia of the second and third division.

Patients like this one call our attention to the use of elective neurosurgical procedures in state men-

*Meeting of April 5, 1956 held at Kings Park State Hospital, Kings Park, N. Y.

tal hospitals, and it may serve to emphasize that operations for pain, as well as other elective neurosurgical methods to correct neurological disorders, like operations for dystonia, dyskinesia, Parkinsonism, etc., are procedures which one should be ready to handle.

Case 2. N.S. A 46 year old female who, four years prior to admission to Kings Park State Hospital, had a thorough neuropsychiatric evaluation at which time no evidence of organic disease was found. While at the hospital she developed a Parkinson syndrome of the right side. Shortly thereafter a corpus callosum tumor was found and a craniotomy was done for its removal.

This case demonstrates that often a mental syndrome can be stimulated by undetected brain tumor and illustrates the necessity of treating brain tumors in a state hospital.

Case 3. R.E. A 38 year old white male with a history of seizures, acute alcoholism and occasional falls resulting in head trauma. An arteriogram showed a mass of the left hemisphere. Exploratory burr holes showed no evidence of subdural hematoma. A craniotomy was done and a large chronic abscess measuring 4 x 5 x 4 was removed from the frontal lobe. The patient had an uneventful postoperative course and recovered rapidly from the pre-operative aphasia and hemiplegia.

We feel that this patient points out once more the need for a flexible approach in doing neurosurgery in a state hospital so that any possible unexpected neurosurgical condition can be properly treated.

Case 4. A 14 year old girl appeared to be a behavior and mental problem. After a complete neuropsychiatric study, the only abnormal finding was an EEG with a so-called petit mal pattern, which in this case represented abnormal electrical activity of the brain (bursts of bilaterally synchronous spikes and waves from all head regions with clinical petit mal as well as psychomotor attacks. She recovered with proper anti-convulsive medication.

Epilepsy in mental patients does not always respond to medication and we ought to be ready to treat epilepsy coincidental with mental illness surgically if necessary. Surgery in epileptics, when done judiciously in order to relieve the convulsive as well as the mental syndrome, may result in gratifying results.

An important part of the neurosurgical activities in state institutions is psychosurgery in the sense that Egaz Moniz introduced the term, meaning operations upon the brain hemispheres for the treatment of mental lilness. Such surgery has been done on all the lobes of the cerebral hemispheres but the methods upon the frontal areas have been more widely used and evaluated in greater detail.

The surgical technics we use are the partial frontal leucotomies, selective undercutting, topectomy and thermocoagulation (Grantham). Other surgical methods, such as stereoencephalotomies, ought to be given the benefit of further evaluation.

In any program to treat mental illness by way of surgical technics, it is of primary importance to have an exact psychiatric evaluation and diagnosis before operation. This should be followed by indicated medical therapies. There are no general rules as to the proper time for surgical treatment and each case must be judged individually. In most mases, when twelve to eighteen months have elapsed without substantial, progressive improvement with systematic medical treatment, the patient is given the benefit of psychosurgery. The post-operative results can be most dramatic but, unfortunately, they are unpredictable.

Our last 50 cases done at Kings Park State Hospital showed that five (10%) recovered; 29 (58%) improved, four of whom can be considered cured since they were placed on convalescent care; 15 (32%) showed no improvement. One of the 50 patients had a severe blood dyscrasia. Surgery was decided on as a calculated risk in order to improve the patient's agitated state. Before the brain could be touched, his condition under general anesthesia was such that the procedure had to be stopped. He died shortly after the operation.

Some of these patients had Serpasil and Thorazine prior to psychosurgery. Others had to be given these drugs after surgery to maintain the post-operative improvement. Our cases indicate that psychosurgery is beneficial when drug therapy fails and that drugs (Serpasil and Thorazine) may be useful after psychosurgery even if they have had no beneficial effect prior to operation.

An electric current administered directly to the brain through intracranial electrodes, to treat mental illness and other conditions, has been in use for some time. This technic was based on the hypothesis that an electric current might be more effective if received directly and selectively by specific brain areas than if it reached the brain in an assumed diffuse manner as in the standard methods of "external electrotherapy." The improvement of mental symptoms and syndromes with this procedure, when external electrotherapy failed was strong evidence in favor of that hypothesis. Intracranial electrotherapy has been found useful, also, in other neurological conditions such as treatment of intractable pain.

The range of activities of neurosurgery at a state hospital is wide and varied. The problems are very similar to those in the neurosurgical services of any large general hospital. In addition, one handles surgery in mental conditions with greater frequency than in private neurosurgical practice.

When a state hospital is connected with a medical school, experimental laboratory research in neurosurgical, neuroendocrinological, enzymetic, biochemical and neurophysiological projects should be encouraged to supplement and further our clinical experiences. As in any other large hospital, the neurosurgical department is but one link in a chain of departments and units and the strength of the whole depends on the integration of each one of the links. To run and supervise such a department, a full-time resident and part-time attending associates are envisioned as the minimum staff.

We have so far outlined what we may call the intramural activities of neurosurgery in a state hospital. As we try to improve our neurosurgical ac-

tivities within the scope of the state hospital, let us not forget that state institutions are a par of the community and that as such we ought to service them as well and efficiently as possible. In most instances, state mental hospitals are located away from the large cities and the big medical centers and closer to the small community hospitals. It is feasible that in the future our operating room facilities will be made available to provide the specialized neurosurgical services lacking in these small community hospitals. Of course, all such possible activities would depend on future policies governing the participation of state hospitals in community projects.

Short Term Treatment in Male Admission Service

DR. D. ANNAU

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Our admission rate averages 100 per month. There are five doctors on the staff and 250 beds. Before discussing the results of our treatment, I would like to mention some of our limitations. First, about 70% of our patients are veterans from all over the United States; thus, we often have difficulty in securing permission for shock treatment. Second, the discharge procedure, securing of home studies by the Social Service, often takes a month or more. Third, the great admission pressure which causes a turnover of the whole population in about two and one-half months forces us frequently to transfer patients who are still under treatment.

We present a statistical work-up of the 1104 admissions and 151 discharges in 1955 with our corresponding treatment. As you see from the table, psychotherapy has first place in frequency, electroconvulsive treatment second and Thorazine treatment is in third place. As you may note in the senile and arteriosclerotic group we have good results with metrazol and vitamins, which were given t.i.d. 1½ grs. metrazol and once daily one capsule of multi-vitamins. This often helped to clear up to some extent the confusion and agitation of these patients. Some of them showed surprising improvement in their memory. We should mention particularly one Alzheimer's case, verified by pneumoencephalography, which showed considerable improvement. We have no cases of insulin coma treatment. These patients are treated in another unit.

In reviewing our results, we feel that electroconvulsive therapy is the best means of getting the patient out of the disturbed condition in a short time, and this improvement was often so impressive and prolonged that the patient could be placed on convalescent care. We feel that in involutional melancholia it is still the only treatment which promises prompt recovery. Even in hebephrenics and paranoid praecox, the electro-convulsive treatment often enables the patient to leave the hospital after a short time. Catatonics still are the most promising group in this category. In the manic depressive group, the manics respond well to electroconvulsive treatment when given twice daily, if necessary. Only when they are already in hypomanic state do they respond to Thorazine. In the depressives, electro-convulsive treatment gives the fastest relief. However, in one case where electroconvulsive treatment was contra-indicated, Thorazine helped to relieve the patient's depression. In psychoneurotic anxiety state, electro-convulsive treatment is utilized only if the patient is not able to cooperate in psychotherapy because of his overwhelming anxiety. After a few such treatments he usually is able to participate in psychotherapy.

Our results with Thorazine are not as impressive as one would expect from the literature. We have the impression that in acute cases Thorazine does not give as good results as in chronic cases. We have the feeling that whenever there is great emotional pressure Thorazine has only a calming effect without any change of the basic disturbance, and after the treatment is discontinued the patient relapses into his former condition. One patient with a chronic cardiac decompensation responded very well to Thorazine.

All forms of short term psychotherapy were utilized, psychoanalytically oriented as well as directive, cathartic and suggestive methods, often combined, mainly in alcoholics. In addition, all the alcoholics regularly took part in the Alcoholics Anonymous meetings.

Our results are not outstanding, but show that with short term treatments in the admission service one can help many patients to leave the hospital without being transferred to a chronic service. We believe that these results could be greatly improved if the limitations mentioned above could be eliminated. In addition, if there would be at least one physician having no other duties than intensive therapy that would again greatly improve our results.

Number of Discharged Patients During 1955

Diagnosis	No.	ECT	Thorazine	Psychotherapy	Metrazol and Vitamins	Hormones
D. P. Hebe.	4	4	–	–	–	–
D. P. Par.	21	12	2	7	–	–
D. P. Simple	10	6	–	4	–	–
D. P. Cat.	15	12	1	2	–	–
M. D. Manic	5	3	2	–	–	–
M. D. Dep.	3	2	1	–	–	–
Alcoholic	45	–	–	45	–	–
Involutional	7	7	–	–	–	–
Senile and C. A. S.	6	–	–	–	6	–
Psychopath	8	1	–	7	–	–
Psychoneurosis Anxiety	12	2	–	10	–	–
Psychoneurosis Depressed	9	–	1	8	–	–
Behavior Dis.	4	–	–	4	–	–
Circulatory Disturbance	1	–	1	–	–	–
Glandular Dis.	1	–	–	–	–	1
	151	49	8	87	6	1

1955

Admissions	1104
Stay in Hospital	50-180 days
Average	80 days

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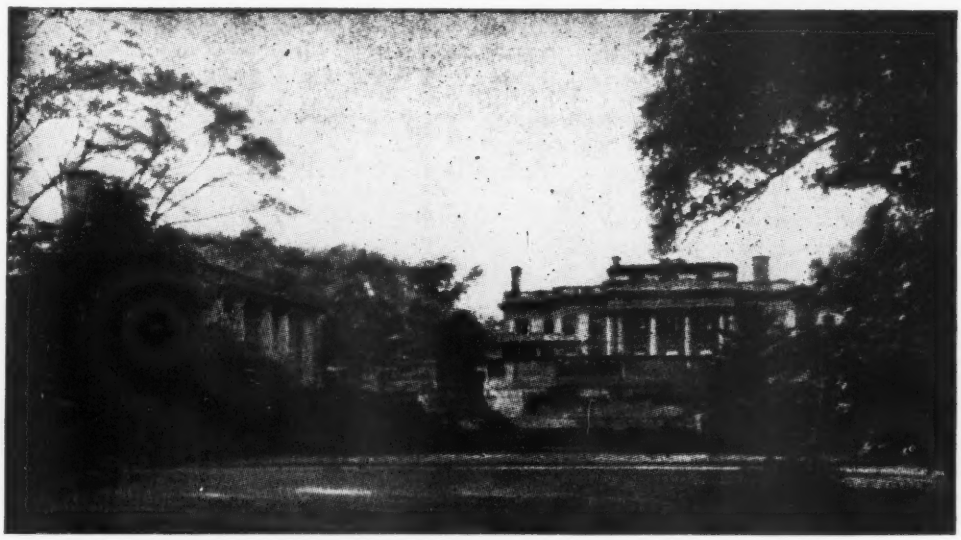

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